

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

A389
M342

UNITED STATES
DEPARTMENT OF AGRICULTURE
LIBRARY



FOR ADMINISTRATIVE USE

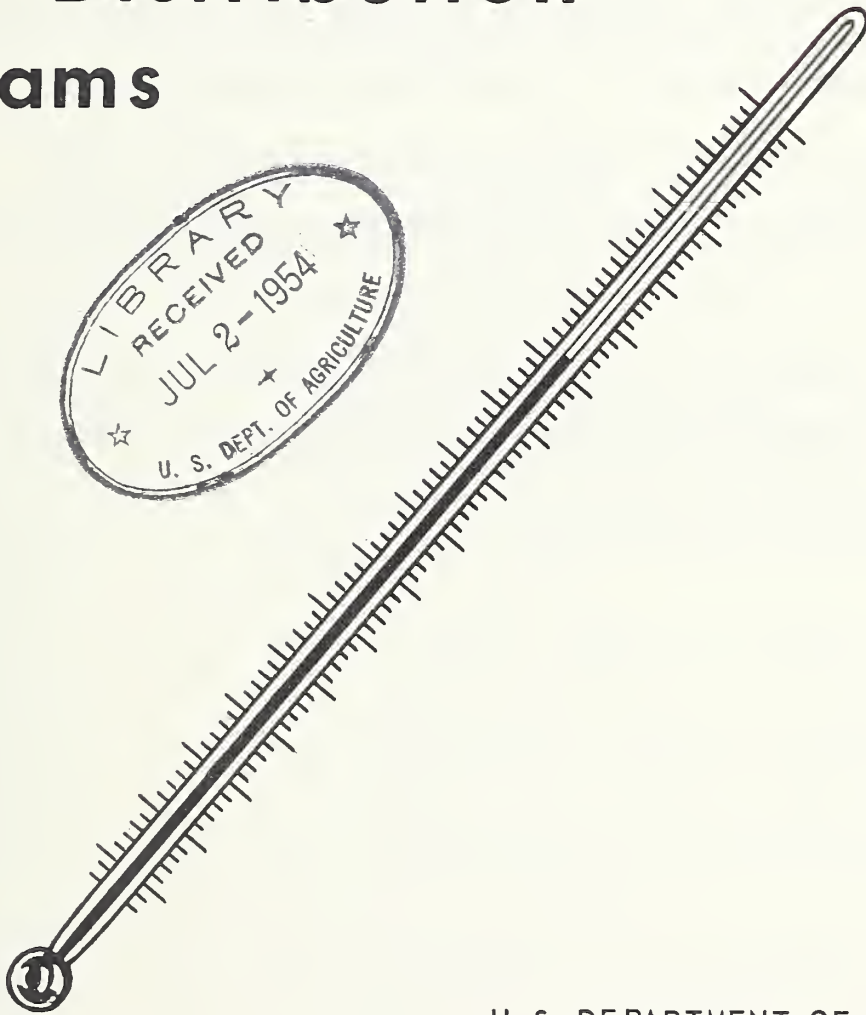
BOOK NUMBER

A389
M342

Thermometers

for use in

School Lunch and Direct Distribution Programs



U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
FOOD DISTRIBUTION DIVISION

Washington, D. C.

May 1954

This pamphlet was prepared for the use of State agencies having responsibility for distributing, storing, and handling foods for the school lunch program. It describes some of the most common types of thermometers suitable for use in refrigerators, freezers, and common- and cold-storage rooms, in the preparation of food, and in the sterilization of dishes after washing.

THERMOMETERS FOR USE IN SCHOOL LUNCH AND DIRECT DISTRIBUTION PROGRAMS

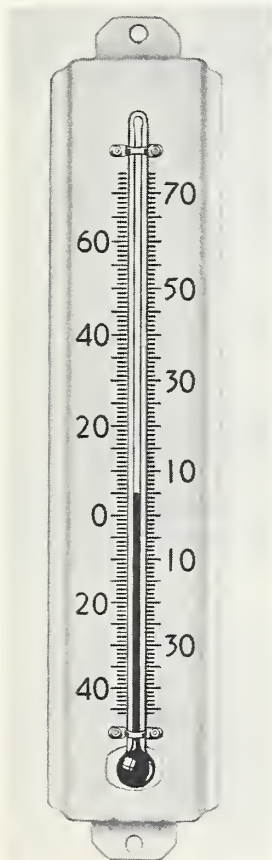
Prepared by Halbert B. Bolin, Food Preservation Specialist,
Food Distribution Division, Agricultural Marketing Service

STORAGE THERMOMETERS

Wherever food is stored, whether in common or refrigerated storage, a reliable thermometer is essential to make sure that temperatures necessary to prevent spoilage and deterioration are being maintained. Schools should be urged to provide a thermometer for each storage facility. Even though refrigerators and freezers have thermostats to control the temperature, schools cannot be sure that the setting is proper for optimum refrigeration without checking the temperature with a reliable thermometer.

State agencies using cold-storage warehouses and frozen-food locker plants to store supplies of perishable commodities for the school lunch program, will find recording thermometers most advantageous in that they provide the only means of knowing whether or not proper temperatures are constantly maintained.

Various types of reliable thermometers for use in storage facilities are shown in this pamphlet. In making selections, consideration will need to be given to the characteristics of the storage space and to the kinds of commodities to be stored.



A wall thermometer, such as the type shown in figure 1, is suitable for use in cold-storage rooms, walk-in refrigerators, walk-in freezers, and institutional size reach-in refrigerators. A dependable thermometer for these purposes should have the following construction characteristics:

1. An overall length of at least 12 inches and mounting holes at top and bottom.
2. A temperature range of at least minus 40° to plus 70° F. in 1°-scale divisions.
3. A red-liquid-filled magnifying-glass tube for easy reading.
4. An enameled scale to prevent rusting.
5. Thermometer bulb and tube fully protected by side flanges on the frame to minimize breakage.

Figure 1.--Wall thermometer.

Wall thermometers for use in common-storage rooms should have a temperature range of minus 30° to plus 120° F. in 2°-scale divisions. It should be mounted in the vicinity of the door where there is least danger of breakage from bumping and at about eye level where it can be easily read. It should not be mounted on the door nor situated in a recess or pocket.

A maximum-minimum thermometer of the type shown in figure 2 is highly recommended for use in any storage space where knowledge of temperature changes is important. It shows the highest and lowest temperatures reached since the last setting of the indices as well as the temperature at the time the reading is made. The bottom of the left tube index will always indicate the lowest temperature; the bottom of the right tube index the highest temperature; and the top of either mercury column the present temperature. To get a daily record of high and low temperatures, the instrument must be reset each day. A magnet is supplied for this purpose. This type of thermometer should have the following construction characteristics:

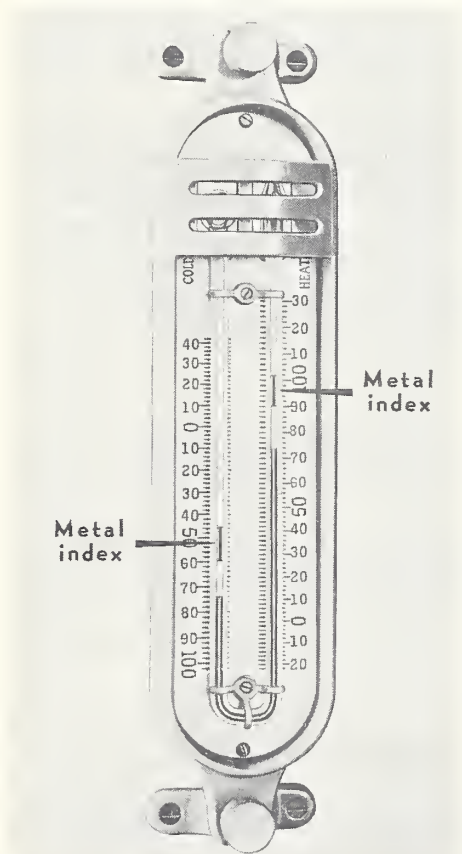


Figure 2.--Maximum-minimum thermometer.

1. An overall length of approximately 12 inches and mounting holes at top and bottom.
2. A minimum temperature range of minus 20° to plus 120° F. in 2°-scale divisions.
3. A mercury-filled magnifying-glass tube for easy reading.
4. An enameled scale and rustproof case.
5. Thermometer bulbs and tube fully protected and ventilated.
6. A magnet for rejoining metal indices with mercury column.

The maximum-minimum thermometer should be mounted on a wall at eye level where there will be no vibration or bumping to jar the indices. It should be located where the air can circulate freely around it.

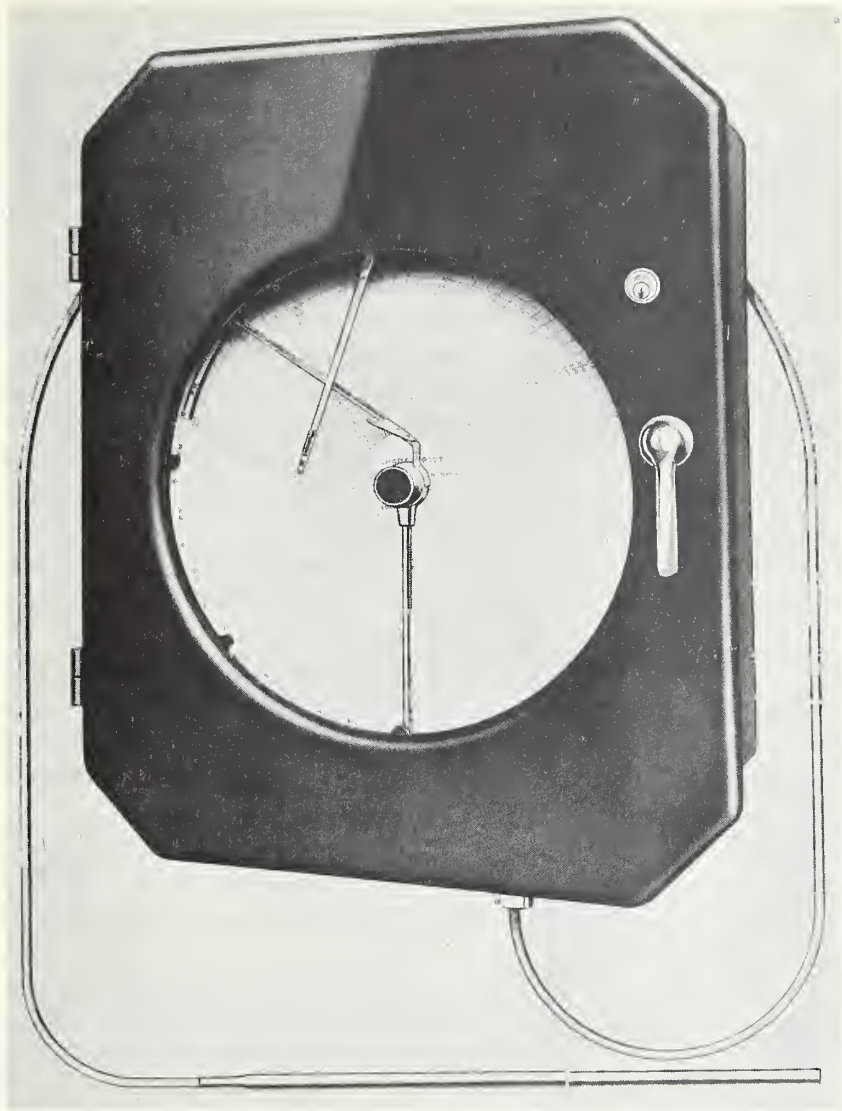


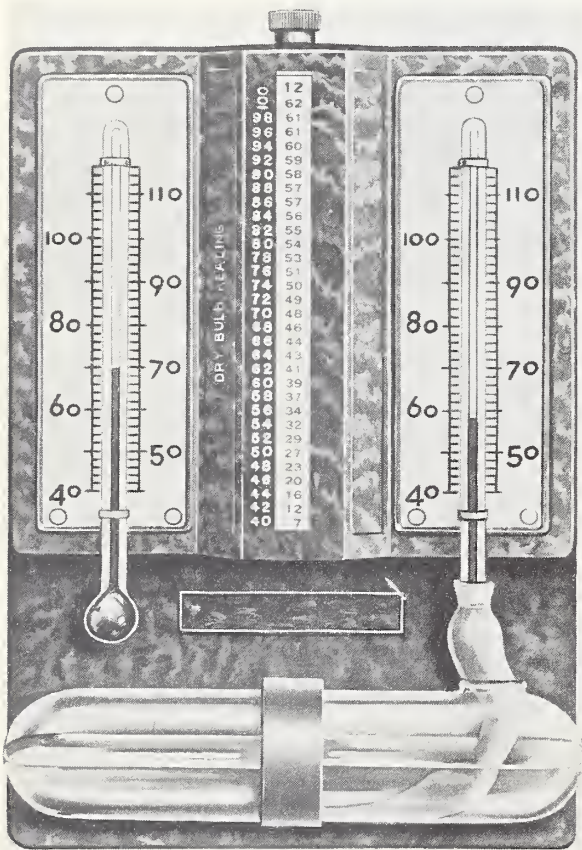
Figure 3.--Single-pen recording thermometer.

A single-pen recording thermometer of the type shown in figure 3 is designed to record continuously the temperatures of cold-storage rooms, freezer rooms, and walk-in refrigerators. The chart rotates once in 7 days providing a complete weekly record. Instruments used for this purpose should have:

1. Rectangular aluminum dustproof case.
2. Smooth stainless capillary between bulb and case.
3. Seven-day revolution chart graduated from at least minus 40° to plus 70° F. in 1°-scale divisions.
4. Mercury-actuated thermal system with temperature-compensated capillary.
5. Lock in door of case to eliminate tampering with recorder, calibration and mechanism.

This type of instrument eliminates any guesswork as to whether the temperatures may have risen too high for safety and, if so, for how long. The recorder is usually mounted outside the refrigerated space, with the temperature sensitive bulb mounted near the space center and toward the top.

A hygrometer, such as the type shown in figure 4, is highly recommended where humidity, as well as temperature, is a factor in proper storage as, for instance, in warehouses where canned goods will rust if the humidity is too high. It can be used only in storerooms and warehouses where temperatures maintained are above freezing. Otherwise the water in the cistern will freeze. The hygrometer gives both the dry- and wet-bulb temperatures of the storage space. When these temperatures are compared in the manner explained on the instrument the relative humidity can be determined. An instrument of this type should have the following construction characteristics:



1. Two red-liquid-filled thermometer tubes mounted on enameled temperature scales in a rustproof case.
2. A temperature range of at least 40° to 110° F. in 2°-scale divisions.
3. A relative humidity scale imprinted on drum-type rustproof cylinder between the two thermometers.
4. A water cistern with spare wicks for attaching to wet-bulb thermometer.

The hygrometer should be placed in a readable position where there is good air velocity, preferably near an inlet or exhaust duct or in the air stream of a fan.

Figure 4.--Hygrometer.

A refrigerator-freezer thermometer of the type shown in figure 5 is designed to hook on a wire basket, shelf, or partition or to be placed on any flat surface. This type of thermometer is suitable for use in reach-in refrigerators or freezers. It should have the following construction characteristics:

1. A temperature range of at least minus 40° to plus 60° F. in 2°-scale divisions.
2. A red-liquid-filled magnifying-glass tube for easy reading.
3. Rustproof scale and frame.
4. Scale completely encased to protect the thermometer bulb and to slow down changes in temperature indications when the door is opened for readings.

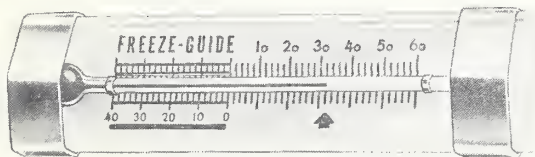


Figure 5.--Refrigerator-freezer thermometer.

The coldest and warmest areas in a refrigerator vary with the type of refrigerator. To determine where these areas are in a given refrigerator a thermometer should be placed in different locations, and the door closed for about an hour before taking a reading. When the warmest area is determined, the thermometer should be placed there and the thermostat adjusted, if necessary, to obtain the recommended storage temperature. The warmest area in a freezer should be determined in the same manner.

A remote-reading thermometer, such as the type shown in figure 6, may be used in either a vertical or a horizontal freezer. It has a capillary tube which permits placing the thermometer scale outside the freezer so that the temperature can be checked without opening the door. This type of thermometer should have the following construction characteristics:

1. A minimum temperature range of minus 40° to plus 60° F. in 2°-scale divisions.
2. A red-liquid-filled magnifying-glass tube with 4 feet of capillary tube and temperature-sensitive bulb attached.
3. Enameled scale completely encased to protect thermometer tube.
4. Mounting holes in metal back.

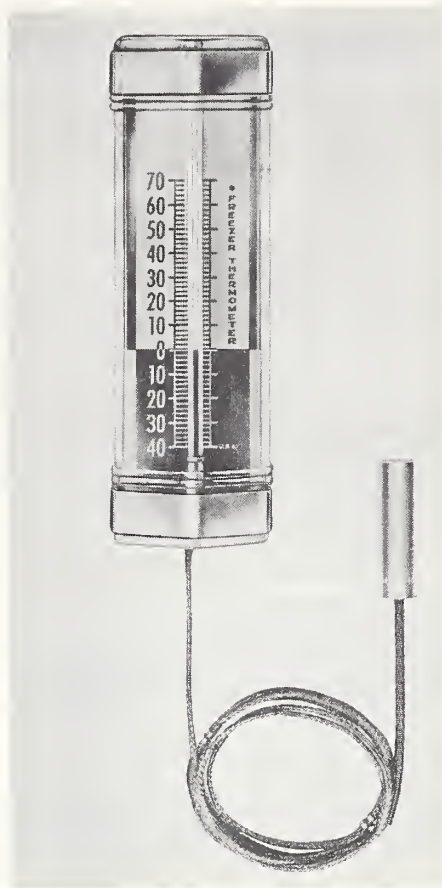


Figure 6.--Remote reading freezer thermometer.

The temperature-sensitive bulb is placed inside the regular storage compartment of the freezer away from packages of food and where air can circulate freely around it. The capillary tube fits easily between the door and the frame of the freezer without affecting the efficiency of the freezer.

COOKING THERMOMETERS

A reliable mercury-filled oven thermometer of the type shown in figure 7, is needed in every school lunch kitchen to make sure that the oven temperatures are right for baking or roasting. Although most ovens have thermostatic controls it is desirable to check their accuracy occasionally with an oven thermometer placed in about the center of the oven. Readings should be taken while the oven is empty and as quickly as possible after opening the oven door. If the thermometer temperature does not agree with the thermostat setting the thermostat should be turned up or down to obtain the desired oven temperature. If the variation is considerable it would be well to call a service man to reset the thermostat. For satisfactory results an oven thermometer should have the following construction characteristics:

1. A minimum temperature range of 200° to 600° F. in 10°-scale divisions.
2. A mercury-filled magnifying-glass tube firmly anchored to the thermometer scale.
3. An enameled scale to prevent rusting.
4. A ventilated base to permit air circulation around the temperature-sensitive bulb.

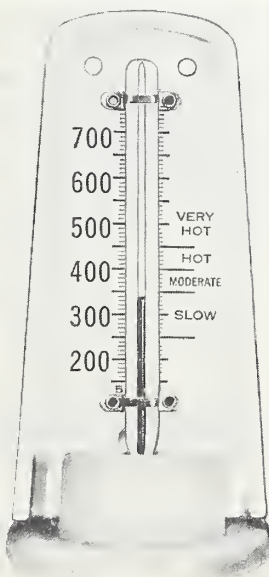


Figure 7.--Oven thermometer.

A roast meat thermometer takes the guesswork out of cooking meat to the desired stage of doneness. It is of particular importance for measuring the internal temperature of fresh pork, cured ham, and cured pork shoulder--all of which must be cooked thoroughly in order to be safe to eat. A roast meat thermometer having a metal stem, as shown in figure 8, is most practical for school lunch use as it is nonbreakable. For satisfactory results it should be inserted in the thickest part of the meat away from bone, gristle, or fat. This type of thermometer should have the following construction characteristics:

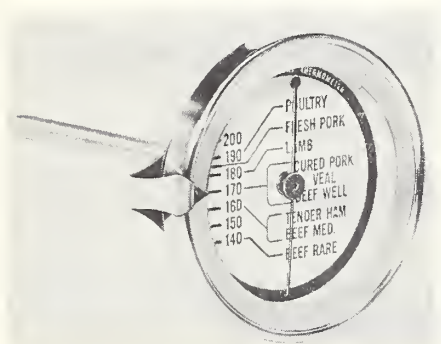


Figure 8.--Roast meat thermometer.

1. A stainless steel stem.
2. A hermetically sealed dial.
3. A temperature range of at least 140° to 200° F. in 5°-scale divisions.
4. A movable metal index that can be set to indicate the required roasting temperature for handy reference after placing in oven.

DISHWASHING THERMOMETERS

To sanitize dishes effectively by the hot-water method it is essential to know the temperature of the water used for rinsing. In most dishwashing machines the temperature of the rinse water is automatically controlled. Where dishes are washed and rinsed by hand, a reliable thermometer is essential. A good type for this purpose is the institutional-size jelly thermometer such as the one shown in figure 9. This thermometer can be clipped to the partition of a 3-compartment sink and adjusted so that the bulb is immersed in the rinse water. Jelly thermometers of this type usually have the following construction characteristics:

1. A temperature range of at least 60° to 360° F. in 2°-scale divisions.
2. An overall length of at least 16 inches so that scale divisions will be spaced for easy reading.
3. A mercury-filled magnifying-glass tube with tube and bulb fully protected in a channel in the frame.
4. Frame of stainless steel with wooden handle firmly riveted to metal frame.
5. Adjustable spring-wire locking-type clip to hold thermometer firmly at desired depth.

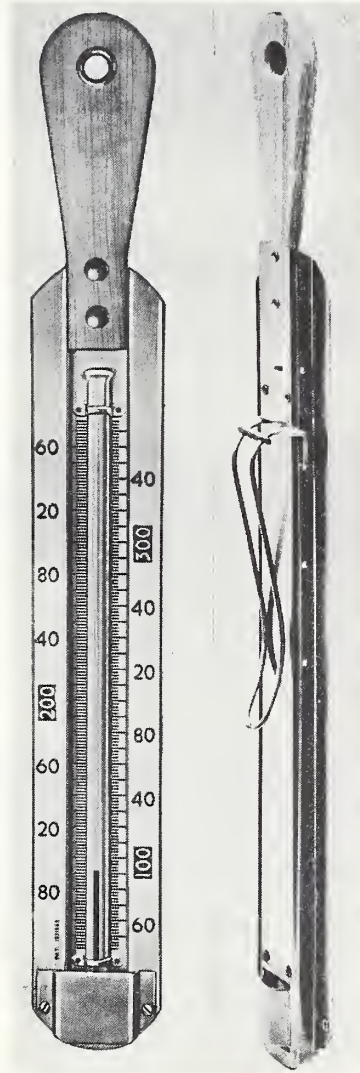


Figure 9.--Jelly thermometer

An institutional size deep-frying thermometer is also satisfactory for use in dish-washing operations.

GENERAL TESTING THERMOMETERS

Supervisory personnel find a general testing thermometer, such as the type shown in figure 10, useful in checking the temperature of storerooms and refrigerators that are not equipped with thermometers. General testing thermometers are also useful in checking the temperature of water used for sterilizing dishes and for checking other operations in which temperature is a factor. Such thermometers, however, are not intended to take the place of the various types recommended herein for specific purposes. A reliable general testing thermometer should have the following construction characteristics:

1. An overall length of approximately 6 inches.
2. A pocket carrying case to protect the thermometer.
3. A temperature range of at least 0° to 220° F. in 2°-scale divisions.
4. A mercury-filled magnifying-glass tube, clearly etched to show temperature range, and having a white enamel strip at the back.
5. A bulb made of clear glass with none of the white enamel backing from the tube in it.

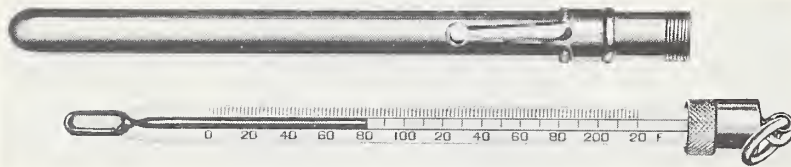


Figure 10.--General testing thermometer.

PARTIAL LIST OF SUPPLIERS OF THERMOMETERS AND OTHER INSTRUMENTS

If local department stores or suppliers of hotel equipment do not carry the thermometers illustrated in this publication they may be obtained from the suppliers listed below. In furnishing this partial list of suppliers, no guarantee of reliability is implied and no discrimination is intended.

Recording thermometers:

The Bristol Company, Instrument Div., 117 Bristol Road,
Waterbury 20, Conn.

The Foxboro Company, 86 Neponset Avenue, Foxboro, Mass.; 1473 Spring Street NW., Atlanta, Ga.; 4546-8 Oakton Street, Chicago, Ill.; 1710 North Akard Street, Dallas 1, Tex.; 420 Lexington Avenue, New York 17, N. Y.; and 266 Fremont Street, San Francisco 5, Calif.

Taylor Instrument Companies, 95 Ames Street, Rochester 1, N. Y.; 501-502 Bona Allen Bldg., Atlanta 3, Ga.; 423 South Boulevard, Oak Park, Ill.; 30 Rockefeller Plaza, New York 17, N. Y.; and 145 Mission Street, San Francisco 19, Calif.

All other thermometers, including hygrometers:

Fee and Stemwedel Inc., 2210 Wabansia Avenue, Chicago, Ill.

Friez Instrument Division, Bendix Aviation Corp., Taylor Avenue, Baltimore 4, Md.

Taylor Instrument Companies, 95 Ames Street, Rochester 1, N. Y.; 501-502 Bona Allen Bldg., Atlanta 3, Ga.; 423 South Boulevard, Oak Park, Ill.; 30 Rockefeller Plaza, New York 17, N. Y.; and 145 Mission Street, San Francisco 19, Calif.

